

Remarks

Claims 1 - 12 and 18 - 23 are pending. Favorable consideration is respectfully requested.

The claimed invention is directed to sprayable, fiber-reinforced, strain-hardening mortar compositions which contain a cement fraction (inorganic binder), a strain hardening amount of specific reinforcing fibers having interfacial chemical bonding less than 4.0 J/m^2 , water, a super plasticizer, a viscosity control agent, and at least one non-Newtonian additive such that the mixture is pumpable and sprayable, yet which exhibits a higher viscosity after spraying, the latter property allowing for greater thickness of sprayable mortar on vertical and inverted surfaces. New claims 18 - 23 have been added to more particularly point out and distinctly claim certain preferred embodiments of Applicants' invention. The new claims are fully supported by the disclosure on pages 8 - 10, and thus presentation of the new claims raises no issue of new matter.

Claims 1 - 12 had been rejected under 35 U.S.C. § 103(a) over Baeuml et. al. U.S. Patent 6,824,607 B2 ("*Baeuml*"), Kodama et al. JP 2001 220188 Abstract ("*Kodama*"), or Kanda et al. JP 2002 193653 Abstract ("*Kanda*"), all individually. Applicants respectfully traverse these rejections.

The subject invention claims are directed to strain hardening compositions containing specific fibers, super plasticizer, and non-Newtonian additive, among the other ingredients, and which are pumpable and sprayable. The Office bases its rejections on the premise that these references "teach the same components in overlapping amounts." However, this is incorrect.

Kodama teaches a "lightweight" cementitious coating material, but fails to indicate whether it is pumpable or sprayable. Most cementitious materials are not pumpable or sprayable, but are applied by conventional hand or casting techniques. Moreover, and most

importantly, *Kodama* fails to teach or suggest that his compositions are strain hardening (most are not); fails to teach or suggest the use of any non-Newtonian additive; and fails to teach or suggest inclusion of 0.1 to 4.0 volume percent of 4 - 30 mm length, 10 μm to 150 μm diameter fibers with interfacial chemical bonding of less than 4.0 J/m². The *Kodama* abstract cites "polyamide fibers, uses" at the bottom of the abstract in the "IT" section, however, there is no indication that these fibers are added to the cement. They may, for example, be included in the forms into which the cement is poured or in reinforcing bars, etc. Even if added to cement, there is no indication that these fibers meet the volume percent, size, or interfacial chemical bonding requirements of the claims. The presence of 15 mm aggregate (0.6 inch) would appear to confirm that the *Kodama* compositions are not pumpable or sprayable. However, as stated previously, there is no disclosure of any non-Newtonian additive, nor of fiber content, characteristics, etc., and no indication that fibers are even added to the composition. As *Kodama* neither teaches or suggests any of these claim limitations, withdrawal of the rejection of the claims over *Kodama* under 35 U.S.C. § 103(a) is solicited.

Kanda discloses cementitious repairing materials containing 1 to 3 volume percent of polyvinyl alcohol fibers, which exhibits a tensile strain of > 1%. However, first, *Kanda* does not disclose that his compositions are strain hardening. Strain hardening compositions exhibit an increase in tensile stress versus strain, and there is no indication that *Kanda's* compositions meet this requirement. The tensile stress may remain constant or decrease with tensile strain until failure occurs. Second, while the fiber sizes and lengths of *Kanda* and their amount meet the limitations of claim 1, there is no indication that these fibers also have interfacial chemical bonding of less than 4.0 J/m². While *Kanda* uses polyvinylalcohol fibers as also do Applicants, the fibers employed by Applicants are oiled fibers (K-II REC™), with an oil content of 0.8 weight percent to lower interfacial chemical bonding to below 4.0 J/m². There is no indication that the *Kanda* fibers are so treated. If the fibers are too strongly attracted to the cement matrix, the fibers cannot release from the matrix as crack formation occurs. Thus, rather than the cracks being able to spread apart and distribute the load placed upon the structure, the fibers will be stressed in place until they fail, generally resulting in catastrophic failure of the structure.

Most importantly, however, *Kanda* completely fails to disclose, teach, or suggest any non-Newtonian additive. Unlike *Kodama*, *Kanda* indicates that his compositions are pumpable and sprayable. However, a non-Newtonian additive is an important feature of the claims which distinguishes Applicants' invention from other sprayable mortars. Since *Kanda* does not teach or suggest this limitation, the claims are non-obvious over *Kanda*, and for this and the foregoing reasons, the rejection under 35 U.S.C. § 103(a) should be withdrawn.

Baeuml is directed to cementitious compositions which can be applied to concrete structures containing steel reinforcement, in which corrosion inhibitors are present and may migrate into the previously poured and now damaged structure to prevent further corrosion of the reinforcement.

Baeuml teaches that fibers may be added, and appears to teach strain hardening (extensional strengthening) as well. However, *Baeuml* is silent regarding the interfacial chemical bonding of these fibers, and includes fibers such as steel which are known not to produce strain hardening behavior, and "polyolefins" in general, which includes polypropylene, also not known to produce such behavior. In the absence of any teaching of the interfacial chemical bonding limitation, *Baeuml* is not a non-obviousness defeating reference.

However, more importantly, *Baeuml* makes no use of any non-Newtonian additive, nor does he teach or suggest that such an additive be added. In the absence of such a teaching, the claims are non-obvious over *Baeuml* for this reason also, and withdrawal of the rejection of the claims over *Baeuml* under 35 U.S.C. § 103(a) is solicited. If any of the rejections are maintained, whether over *Baeuml*, *Kanda*, *Kodama*, or any other reference or combination of references, Applicants respectfully request that the Office cite with particularity, using page and/or column numbers and line numbers identifying the teaching of each of the claim limitations in the references.

Applicants submit that the claims are now in condition for Allowance, and respectfully request a Notice to that effect. If the Examiner believes that further discussion will advance the prosecution of the Application, the Examiner is highly encouraged to telephone Applicants' attorney at the number given below.

Respectfully submitted,

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Date: November 23, 2005

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